

WHAT IS CLAIMED IS:

1. A grating interference encoder comprising:
 - a light-emitting device;
 - a diffraction grating for generating two diffracted light beams having different orders by being irradiated by a coherent light beam from an illuminating optical system;
 - an annular grating for deflecting the two diffracted light beams having the different orders generated from said diffraction grating to cause the deflected light beams to be reprojected onto said diffraction grating; and
 - a beam splitter for guiding a light beam, obtained by causing diffracted light beams generated by rediffraction of the diffracted light beams reprojected onto said diffraction grating to be superposed and interfere with each other, to a photosensor; and
 - said photosensor.
2. An encoder according to Claim 1, wherein said annular grating comprises a reflection diffraction grating.
3. An encoder according to Claim 1, wherein said annular grating is a transmission diffraction grating, wherein diffracted light beams transmitted through and diffracted by said transmission diffraction grating are reflected by a reflecting optical element, and wherein twice diffracted light beams rediffracted by said transmission diffraction grating are projected onto said diffraction grating.

4. An encoder according to Claim 1, wherein said annular grating is local.

5. A grating interference encoder comprising:

a light-emitting device;

a diffraction grating for generating two diffracted light beams having different orders by being irradiated by a coherent light beam from an illuminating optical system;

an annular grating for deflecting the two diffracted light beams having the different orders generated from said diffraction grating to cause the deflected light beams to be reprojected onto said diffraction grating;

a condenser for condensing the diffracted light beams generated by said diffraction grating onto substantially one point on said annular grating; and

a beam splitter for guiding a light beam, obtained by causing diffracted light beams generated by rediffraction of the diffracted light beams reprojected onto said diffraction grating to be superposed and interfere with each other, to a photosensor; and

said photosensor.

6. An encoder according to Claim 5, wherein said annular grating comprises a reflection diffraction grating.

7. An encoder according to Claim 5, wherein said annular grating is local.

8. An encoder according to Claim 5, wherein said condenser comprises a diffraction lens.

9. A grating interference encoder comprising:
a light-emitting device;
a diffraction grating for generating two diffracted light beams having different orders by being irradiated by a coherent light beam from an illuminating optical system;
an annular grating for deflecting the two diffracted light beams having the different orders generated from said diffraction grating to cause the deflected light beams to be reprojected onto said diffraction grating;

a condenser for making the diffracted light beams generated by said diffraction grating in a state of tending to be condensed on said annular grating; and

a beam splitter for guiding a light beam, obtained by causing diffracted light beams generated by rediffraction of the diffracted light beams reprojected onto said diffraction grating to be superposed and interfere with each other, to a photosensor; and

said photosensor.

10. An encoder according to Claim 8, wherein said annular grating comprises a reflection diffraction grating.

11. An encoder according to Claim 8, wherein said annular grating is local.

12. A grating interference encoder comprising:
a light-emitting device;
a diffraction grating for generating two diffracted light beams having different orders by being irradiated by a coherent light beam from an illuminating optical system;

an annular grating for deflecting the two diffracted light beams having the different orders generated from said diffraction grating to cause the deflected light beams to be reprojected onto said diffraction grating;

a condenser for condensing the diffracted light beams generated by said diffraction grating onto substantially one point on said diffraction grating; and

a beam splitter for guiding a light beam, obtained by causing diffracted light beams generated by rediffraction of the diffracted light beams reprojected onto said diffraction grating to be superposed and interfere with each other, to a photosensor; and

said photosensor.

13. An encoder according to Claim 12, wherein said annular grating comprises a reflection diffraction grating.

14. An encoder according to Claim 12, wherein said annular grating is local.

15. A grating interference encoder comprising:
a light-emitting device;

a diffraction grating for generating two diffracted light beams having different orders by being irradiated by a coherent light beam from an illuminating optical system;

an annular grating for deflecting the two diffracted light beams having the different orders generated from said diffraction grating to cause the deflected light beams to be reprojected onto said diffraction grating;

a condenser for projecting the diffracted light beams generated by said diffraction grating in a state of tending to be condensed on said annular grating for causing the diffracted light beams to be diffracted and deflected, and for condensing the diffracted light beams onto substantially one point on said diffraction grating; and

a beam splitter for guiding a light beam, obtained by causing diffracted light beams generated by rediffraction of the diffracted light beams reprojected onto said diffraction grating to be superposed and interfere with each other, to a photosensor; and

said photosensor.

16. An encoder according to Claim 15, wherein said annular grating comprises a reflection diffraction grating.

17. An encoder according to Claim 15, wherein said annular grating is local.

18. A grating interference encoder comprising:

a light-emitting device;

a diffraction grating for generating two diffracted light beams having

different orders by being irradiated by a coherent light beam from an illuminating optical system;

an annular grating for deflecting the two diffracted light beams having the different orders generated from said diffraction grating to cause the deflected light beams to be reprojected onto said diffraction grating;

a linear condenser for linearly condensing the coherent light beam from said light-emitting device onto said diffraction grating; and

a beam splitter for guiding a light beam, obtained by causing diffracted light beams generated by rediffraction of the diffracted light beams reprojected onto said diffraction grating to be superposed and interfere with each other, to a photosensor; and

said photosensor.

19. An encoder according to Claim 18, wherein said annular grating comprises a reflection diffraction grating.

20. An encoder according to Claim 18, wherein said annular grating is a transmission diffraction grating, wherein diffracted light beams transmitted through and diffracted by said transmission diffraction grating are reflected by a reflecting optical element, and wherein twice diffracted light beams rediffracted by said transmission diffraction grating are projected onto said diffraction grating.

21. An encoder according to Claim 18, wherein said annular grating is local.

22. An encoder according to Claim 18, wherein said linear condensing element comprises a cylindrical lens.
23. An encoder according to Claim 18, wherein said linear condensing element comprises a diffraction lens.